

TERMS OF REFERENCE FOR THE R&D PROJECTS
TXD 34-TECHNICAL TEXTILES FOR BUILDTECH APPLICATIONS SECTIONAL
COMMITTEE

1. Title of the Project: A comprehensive study of the constructional and performance requirements of scaffolding nets used in construction activities for high rise buildings/structures.

2. Background

2.1 Scaffolding nets, also referred to as safety nets or debris nets, is a crucial component for construction and workplace safety. These are specialized nets designed to provide protection against falling debris during construction and maintenance work conducted at elevated heights. These nets serve dual purposes of providing containment of debris and at the same time providing adequate ventilation for air and light to pass through them. Scaffolding nets are mainly manufactured from tapes or monofilaments of nylon, High Density Polyethylene (HDPE) and polyester. However, mostly the use of HDPE scaffolding nets is prevalent in the market. Scaffolding nets made from tapes generally exhibit lower strength. Consequently, this project focuses exclusively on the HDPE monofilament scaffolding nets, given their prevalent usage and superior qualities.

2.2 Presently, it has been noticed that agricultural shade nets [As per IS 16008 (Part 1 and Part 2) for agriculture and horticulture shade nets] are being used in place of scaffolding nets in constructional work areas due to non-availability of Indian standard on the subject. However, it is crucial to note that these agricultural shade nets are not suitable for use in construction activities in high rise buildings and may pose significant risks to the safety and well-being of individuals involved in such activities.

2.3 Additionally, it is important to note that the Environmental Impact Assessment guidance manual for building, construction, townships, and area development projects by the Ministry of Environment and Forest addresses the importance of covering scaffolding as a measure to mitigate dust pollution. However, it does not provide specific details on the type of nets or materials to be used for such covering. Similarly, the guidelines for mitigating air pollution by the Brihan Mumbai Municipal Corporation state that all buildings under construction must be mandatorily covered with green cloth, tarpaulin, or jute sheet.

2.4 Considering the importance of scaffolding nets in ensuring the safety of workers involved in construction and maintenance activities and with an aim to mitigate the risk of life-threatening situations at for people working at construction sites of high rise structures and as well as safeguarding individuals in the vicinity of these sites, it has been decided to undertake a research and development project on scaffolding nets.

3. Objective

3.1 To collect and analyse the relevant the technical data/information for performance and constructional requirements of HDPE monofilament scaffolding nets used in construction activities for high rise buildings/structures from both primary and secondary sources.

4. Scope

4.1 Study and analysis of the available literature including but not restricted to the following:

- National and International standards and regulation,
- Journals and research papers,
- Guidelines of ministries/departments/regulators/users,
- Books and magazines,
- Any other relevant published information.

4.2 Collection of the database for manufacturers (small, medium and large-scale), testing infrastructure and user base in the country.

4.3 Collection of import and export data, type of standards and regulation being followed by domestic/foreign manufacturers, comparative analysis of these standards and regulation.

4.4 Undertake 2 visits to each of small, medium and large-scale manufacturer and collect the information on the following aspects :-

- i) Data of the requirements of raw material.
- ii) Manufacturing process
- iii) In-process controls being exercised during manufacturing
- iv) Testing method being used.
- v) Testing infrastructure available.
- vi) Post manufacturing quality/in-house data for all the varieties being manufactured.
- vii) Sampling plan being followed.
- viii) Marking and labelling of the product.
- ix) Packaging requirements and storage conditions
- x) Sustainability practices [sustainable raw material, energy efficient processes and methodologies, renewable energy sources, 3Rs (Reduce, Reuse and Recycle), waste management and disposal mechanisms]
- xi) Focused group discussions with teams involved in production, testing, and R&D to address quality issues, discuss challenges faced, and gather suggestions for improvement.

The feedback from other manufacturers (where visit is not carried out) shall be collected by circulating suitable questionnaire covering above information through email or any other digital means.

4.5 Undertake 2 visits to users and 2 visits to testing labs (one govt and one private NABL accredited lab) to collect information including but not restricted to the following: -

User

- i) Standards and regulations being followed.
- ii) Compliance mechanism being followed (test certificate from supplier, third party testing)

- iii) Focused group discussion on quality issues, challenges being faced and suggestions, if any.

Lab

- i) Standards and regulation being followed.
- ii) Testing methods being followed.
- iii) Testing infrastructure
- iv) Focused group discussion on testing related issues, challenges being faced and suggestion.

The feedback from users and labs where visit cannot be carried out shall be obtained through suitable questionnaire covering above information.

4.6 Collection of the samples (as per the sampling plan given below) and generation of test data for the following requirements of HDPE monofilament Scaffolding Nets after getting the samples tested from 2 NABL accredited labs.

- GSM
- Tensile strength,
- Elongation at break,
- Bursting strength,
- UV resistance, and
- Constructional particulars

SAMPLING PLAN:

Sl No.	Type of Industry	Variety (GSMwise)	Lab	Quantity of samples
1	Small scale Manufacturer	120 to 149	Lab 1	1 Sample of appropriate size for testing all the requirements
			Lab 2	1 Sample of appropriate size for testing all the requirements
		150 to 169	Lab 1	1 Sample of appropriate size for testing all the requirements
			Lab 2	1 Sample of appropriate size for testing all the requirements
		170 to 199	Lab 1	1 Sample of appropriate size for testing all the requirements
			Lab 2	1 Sample of appropriate size for testing all the requirements
		200 or above	Lab 1	1 Sample of appropriate size for testing all the requirements
			Lab 2	1 Sample of appropriate size for testing all the requirements
2	Medium scale Manufacturer	120 to 149	Lab 1	1 Sample of appropriate size for testing all the requirements
			Lab 2	1 Sample of appropriate size for testing all the requirements

				requirements		
		150 to 169	Lab 1	1 Sample of appropriate size for testing all the requirements		
			Lab 2	1 Sample of appropriate size for testing all the requirements		
		170 to 199	Lab 1	1 Sample of appropriate size for testing all the requirements		
			Lab 2	1 Sample of appropriate size for testing all the requirements		
		200 or above	Lab 1	1 Sample of appropriate size for testing all the requirements		
			Lab 2	1 Sample of appropriate size for testing all the requirements		
3	Large scale Manufacturer	120 to 149	Lab 1	1 Sample of appropriate size for testing all the requirements		
			Lab 2	1 Sample of appropriate size for testing all the requirements		
		150 to 169	Lab 1	1 Sample of appropriate size for testing all the requirements		
			Lab 2	1 Sample of appropriate size for testing all the requirements		
		170 to 199	Lab 1	1 Sample of appropriate size for testing all the requirements		
			Lab 2	1 Sample of appropriate size for testing all the requirements		
		200 or above	Lab 1	1 Sample of appropriate size for testing all the requirements		
			Lab 2	1 Sample of appropriate size for testing all the requirements		
		Notes:				
		1 The test for UV resistance shall only be conducted on any one sample as the requirement is material dependant.				

4.7 Preparation of a comprehensive report with detailed summary of the above information (in both hardcopy and soft copy).

5. Research Methodology:

5.1 Collect and analyse the data/information as specified in the scope [4.1, 4.2 and 4.3].

5.2 Visit manufacturers, users and labs and collect data/information as specified in the scope [4.4 and 4.5].

5.3 Collect and test the samples as specified in the scope 4.6.

5.4 Analysis the data/information and prepare a comprehensive project report.

6. Expected Deliverables

Comprehensive report (both hard copy and soft copy) consisting of outcomes of the study covering all the aspects of the scope appending the survey formats and responses, questionnaire, results and result analysis of testing, reports of visits and other relevant documents/information.

7. Requirement for the CVs:

The person shall be graduate in Textile Engineering or Textile Technology or Textiles Chemistry or Fibre science and technology.

8. Timeline and Method of Progress Review:

The duration of the project is 120 months from the date of the award of the project. The stagewise indicative timelines are as follows:

Indicative Time line	Method of progress
0 to 20 days	Literature review, desktop study, collection of data and information
21 to 50 days	Visit to manufacturer, user, testing lab and collection of samples
51 to 100 days	Testing of samples preparation and submission of first draft report.
101 to 120 days	Submission of the final project report.

9. Support BIS will Provide:

1. All the relevant Indian Standards and international Standards required during the project will be provided by BIS.
2. Licensee details relating to manufacturing similar products.
3. List of BIS approved laboratories testing similar products.
4. In case of queries/clarification, Shri Mayur Katiyar, Scientist B and Member Secretary of TXD 34 may be contacted on txd@bis.gov.in, 7317525252.